

Amendments to the claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. *(original)* A method for monitoring protein synthesis in a protein synthesis system, the method comprising:

providing a marker for protein synthesis in the system, said marker being detectable through detection of electromagnetic radiation;

detecting electromagnetic radiation emitted from the system; and

analyzing said emitted radiation to monitor protein synthesis activity in said system.

2. *(original)* The method of claim 1 wherein the system comprises a bacterium or bacterial culture.

3. *(original)* The method of claim 1 wherein the system comprises at least one cell.

4. *(original)* The method of claim 3, wherein the system comprises at least one of a cell-line or a cell culture.

5. *(original)* The method of claim 1 wherein the system comprises a cell-free protein translation system (*in-vitro* translation system).

6. *(original)* The method of claim 1 wherein one or more of ribosomes, ribosomal RNA, ribosomal proteins, tRNAs, or amino acids in the system are artificially adapted to provide said marker.

7. *(original)* The method of claim 1 wherein said marker comprises at least a portion of one or more of natural ribosomes, ribosomal RNA, ribosomal proteins, tRNAs, or amino acids.

8. *(currently amended)* The method of ~~any of~~ claims 1-7 wherein said marker comprises at least one photo-active component.
9. *(currently amended)* The method of ~~any of~~ claims 1-8, wherein said emitted radiation comprises radiation obtained by energy transfer between at least two of a plurality of components of the system.
10. *(original)* The method of claim 9 wherein said marker comprises at lease one fluorescent donor-acceptor pair.
11. *(original)* The method of claim 10, wherein said emitted radiation comprises a FRET (Fluorescence resonance energy transfer) signal.
12. *(currently amended)* The method of ~~any of~~ claims 8-11 wherein said emitted radiation comprises a fluorescent signal.
13. *(currently amended)* The method of ~~any of~~ claims 8-12 wherein at least a portion of said marker comprises at least one of a fluorescent protein, a fluorescent dye, a quantum dot or a luminescent substance.
14. *(original)* The method of claim 13, wherein said luminescent substance comprises a luminescent protein or portion thereof.
15. *(currently amended)* The method of ~~any of~~ claims 1-8, wherein said marker comprises a first portion being a fluorescent substance and a second porton for quenching said fluorescent substance.
16. *(original)* The method of claim 15, wherein said detecting comprises detecting a reduction in emitted radiation.

17. (*currently amended*) The method of ~~any of~~ claims 8-16, wherein at least a portion of said marker is covalently or non-covalently bound to a tRNA.
18. (*currently amended*) The method of ~~any of~~ claims 8-17, wherein at least a portion of said marker is covalently or non-covalently bound to a portion of a ribosome.
19. (*original*) The method of claim 18, wherein said portion of said ribosome is at or near at least one of the A site, P site, E site or peptide exit channel site.
20. (*currently amended*) The method of claims 18 or ~~19~~, wherein said at least a portion comprises an amino acid.
21. (*currently amended*) The method of ~~any of~~ claims 1-20 wherein said detecting comprises irradiating the system with electromagnetic radiation.
23. (*currently amended*) The method of ~~any of~~ claims 1-21 wherein said emitted radiation is detected with a microscope.
24. (*currently amended*) The method of ~~any~~ claims 1-23, adapted to measure emitted radiation from a single ribosome.
25. (*original*) The method of claim 24, wherein said marker comprises a donor-acceptor fluorescent pair suitable for performing single pair FRET and wherein said emitted radiation occurs upon performing single pair FRET.
26. (*currently amended*) The method of ~~any of~~ claims 1-23, adapted to measure signals from a plurality of ribosomes.

27. (*original*) The method of claim 26, wherein said analyzing said emitted radiation comprises performing signal analysis of emitted radiation from said plurality of ribosomes.

28. (*currently amended*) The method of ~~any of claims 1–27~~, further comprising: identifying at least one protein being synthesized through said analyzing said emitted radiation.

29. (*currently amended*) The method of ~~any of claims 1–28~~, wherein said detecting is performed in real time.

30. (*currently amended*) The method of ~~any of claims 1–29~~, wherein said detecting further comprises:

monitoring protein synthesis by detecting a plurality of protein synthetic processes over a period of time.

31. (*original*) The method of claim 30, wherein said plurality of protein synthetic processes comprise a plurality of interactions between a ribosome and a plurality of different tRNA molecules.

32. (*original*) An apparatus for measuring protein synthesis by a protein synthesis system, said apparatus comprising:

a container for containing a plurality of components for the system, wherein at least one component is capable of emitting electromagnetic radiation due to a protein synthesis activity;
a detection system to measure emitted radiation from the system; and
a computational device to analyze said emitted radiation and determine the protein synthesis activity in said system.

33. (*original*) The apparatus of claim 32 wherein the system comprises a bacterium or bacterial culture.

34. *(original)* The apparatus of claim 32 wherein the system comprises at least one cell.

35. *(original)* The apparatus of claim 34, wherein the system comprises at least one of a cell-line or a cell culture.

36. *(original)* The apparatus of claim 32, wherein the system comprises a cell-free protein translation system (*in-vitro* translation system).

37. *(original)* The apparatus of claim 32, wherein one or more of ribosomes, ribosomal RNA, ribosomal proteins, tRNAs, or amino acids in the system are artificially adapted to provide said marker.

38. *(original)* The apparatus of claim 32, wherein said marker comprises at least a portion of one or more of natural ribosomes, ribosomal RNA, ribosomal proteins, tRNAs, or amino acids.

39. *(currently amended)* The apparatus of ~~any of~~ claims 32–38, wherein said marker comprises at least one photo-active component.

40. *(currently amended)* The apparatus of ~~any of~~ claims 32–39, wherein said emitted radiation comprises radiation obtained by energy transfer between at least two of a plurality of components of the system.

41. *(original)* The apparatus of claim 40, wherein said marker comprises at least one fluorescent donor-acceptor pair.

42. *(original)* The apparatus of claim 41, wherein said emitted radiation comprises a FRET (Fluorescence resonance energy transfer) signal.

43. (*currently amended*) The apparatus of ~~any of~~ claims 39–42, wherein said emitted radiation comprises a fluorescent signal.

44. (*currently amended*) The apparatus of ~~any of~~ claims 39–43, wherein at least a portion of said marker comprises at least one of a fluorescent protein, a fluorescent dye, a quantum dot or a luminescent substance.

45. (*original*) The apparatus of claim 44, wherein said luminescent substance comprises a luminescent protein or portion thereof.

46. (*currently amended*) The apparatus of ~~any of~~ claims 32–39, wherein said marker comprises a first portion being a fluorescent substance and a second portion for quenching said fluorescent substance.

47. (*original*) The apparatus of claim 46, wherein said detection system detects a reduction in emitted radiation.

48. (*currently amended*) The apparatus of ~~any of~~ claims 39–47, wherein at least a portion of said marker is covalently or non-covalently bound to a tRNA.

49. (*currently amended*) The apparatus of ~~any of~~ claims 39–48, wherein at least a portion of said marker is covalently or non-covalently bound to at least a portion of a ribosome.

50. (*original*) The apparatus of claim 49, wherein said portion of said ribosome is at or near at least one of the A site, P site, E site or peptide exit channel site.

51. (*currently amended*) The apparatus of claims 49 ~~or 50~~, wherein said at least a portion comprises an amino acid.

52. (*currently amended*) The apparatus of ~~any of~~ claims 32-51 wherein said detection system irradiates the system with electromagnetic radiation.

53. (*currently amended*) The apparatus of ~~any of~~ claims 32-52 wherein said detection system comprises a microscope.

54. (*currently amended*) The apparatus of ~~any of~~ claims 32-23, wherein said detection system measures emitted radiation from a single ribosome.

55. (*original*) The apparatus of claim 54, wherein said marker comprises a donor-acceptor fluorescent pair suitable for performing single pair FRET and wherein said emitted radiation occurs upon performing single pair FRET.

56. (*currently amended*) The apparatus of ~~any of~~ claims 32-53, wherein said detection system measures a plurality of signals from a plurality of ribosomes.

57. (*original*) The apparatus of claim 56, wherein said computational device performs signal analysis of emitted radiation from said plurality of signals.

58. (*currently amended*) The apparatus of ~~any of~~ claims 32-57, further comprising equipment for identifying at least one protein being synthesized through said analyzing said emitted radiation.

59. (*currently amended*) The apparatus of ~~any of~~ claims 32-28, wherein said detection system operates in real time.

60. (*currently amended*) The apparatus of ~~any of~~ claims 32-59, wherein said detection system monitors protein synthesis by detecting a plurality of protein synthetic processes over a period of time.

61. (*original*) The apparatus of claim 60, wherein said plurality of protein synthetic processes comprise a plurality of interactions of a single ribosome with a plurality of different tRNA molecules.

62. (*currently amended*) A method for analyzing a chemical compound library, said method comprising:

administering each of the compounds to a protein translation system;
measuring a response of said system according to the method of ~~any of claims 1-31~~;
analyzing said measurement to provide information about said compound.

63. (*currently amended*) An apparatus for analyzing a chemical compound library, comprising: a well array plate comprising a plurality of wells:

a robot for placing a protein synthesis system into the wells;
a robot for administering chemical compounds into said wells; and
an apparatus according to ~~any of claims 32-61~~ to analyze protein synthesis by said system.

64. (*currently amended*) A method for determining cellular protein pathways, comprising:

selecting a cellular or bacterial culture;
placing said culture in a plurality of sample containers;
subjecting said culture to at least one condition in each of said containers;
measuring protein synthesis in each of said contains according to the method of claims 1-31; and
analyzing protein expression patterns in all containers to determine protein pathways.

65. (*original*) A method for ribosome labeling to allow protein synthesis monitoring, said method comprising:

selecting a fluorescent probe;
selecting a location on at least one of a ribosomal RNA or on a ribosomal protein according to at least one of a characteristic of said probe or a characteristic of at least one of said

ribosomal RNA or said ribosomal protein; and
attaching said probe to said location.

66. (*original*) The method of claim 65, wherein said selecting said fluorescent probe is performed according to at least one of a suitable excitation or emission property of said probe.

67. (*original*) A method for protein production monitoring, said method comprising:
selecting a protein synthesis system for PSM analysis;
selecting a fluorescent probe;
selecting a location on at least one of a ribosomal RNA or on a ribosomal protein according to at least one of a characteristic of said probe or a characteristic of at least one of said ribosomal RNA or said ribosomal protein;
attaching said probe to said location to perform PSM; and
analyzing signals from said probe to monitor the protein synthesis system.

68. (*original*) A method for detecting protein synthesis in a protein synthesis system, the method comprising:

providing a marker for protein synthesis in the system, said marker having a label;
attaching said marker to at least one component of the system; and
detecting said label to determine protein synthesis activity in the system.

69-85. (*canceled*)